Royalston WW
1040 Alger Street
Winchendon, MA 01475
Attn: Denis Meunier

8/4/2017

Dear Mr. Meunier,

Enclosed please find the toxicological evaluation and chemical analyses report for the effluent received on July 11, 2017. This is your third quarter 2017 bioassay. Please call me at (401) 353-3420 if you have any questions.

Sincerely,

Michael McCallum
Technical Laboratory Director

TOXICOLOGICAL EVALUATION AND CHEMICAL ANALYSES OF EFFLUENT:
NPDES Permit # MA0100633
Third Quarter 2017 Sample
Royalston

Prepared For:
Royalston Wastewater
15 Blossom Street
South Royalston, MA 01368

August 4, 2017

By
New England Testing Laboratory, Inc.
1254 Douglas Avenue
North Providence, Rhode Island 02904

Reviewed By:

Michael McCallum
Technical Laboratory Director

NETLAB CASE NUMBER: 7G11085

New England Bioassay

A Division of GZA

GEOTECHNICAL
ENVIRONMENTAL
ECOLOGICAL
WATER
CONSTRUCTION MANAGEMENT

77 Batson Drive
Manchester, CT 06042
T: 860.643.9560
F: 860.646.7169
www.nebio.com

ACUTE AQUATIC TOXICITY TEST REPORT

Town of Royalston WWTF
South Royalston, MA
NPDES Permit: MA0100161
Receiving Water: Millers River

Test Start Date: July 11, 2017

Test Period: July 2017

Report Prepared by:

New England Bioassay
A division of GZA GeoEnvironmental, Inc.
77 Batson Drive
Manchester, CT 06042

NEB Project Number: 05.0045052.00

Report Date: August 1, 2017

Report Submitted to:

New England Testing Laboratories
59 Greenhill Street
West Warwick, RI02893

Sample ID: Effluent

Whole Effluent Toxicity Testing Report Instruction Form

Client Name/Project: NET / Royalston WWTF Test Date: 7/11/17

Sample ID: Effluent

Your results were as follows:

X Pass

□ Fail – Please proceed according to the instructions in your permit.

□ Invalid – **Retesting is still required. Retest report will be sent at a later date under separate cover.**

□ Original Test Invalid – **Valid retest performed. Both test and retest results are attached.**

□ Retesting will be or has been performed according to the Case 1 Protocols outlined in the attached copy of EPA-New England's species-specific, self-implementing policy for alternate dilution water.

□ This is your _____ case of dilution water toxicity. Please proceed according to the Case 2 Protocols outlined in the attached copy of EPA-New England's species-specific, self-implementing policy for alternate dilution water. The alternate dilution water you select for future tests for this species should be described as follows: "synthetic laboratory water made up according to EPA's toxicity test protocols, by adding specified amounts of salts into deionized water in order to match the hardness of our receiving water." Writing this letter should help you to avoid retests in the future.

□ Available information is insufficient to determine whether this test passed or failed. Please compare results to your permit limits. Please submit a current copy of your permit to the NEB Lab so that we can determine the status of future tests results and help ensure your compliance with permit requirements.

Please complete the items on this list before reporting these results according to the instructions in the "Monitoring and Reporting" Section of your permit.

- Please complete, sign and date the upper portion of the "Whole Effluent Toxicity Test Report Certification" page which is the page directly following this page.
- Fill in the Sample Type and Sample Method (upper right) and the Permit Limits (lower left) on the GeoEnvironmental, Inc.-EPA Toxicity Test Summary Sheet(s) if they are incomplete.
- Fill in any missing information on the NEB Chain-of-Custody documents. This includes ensuring that the following information is recorded: Sampler's name and title, Facility name and address, Sample collection methods, Sample collection start and end dates and times, Types of sample, Chlorination status of samples upon shipment to NEB, Site description and Sample collection procedures.
- Monitoring results should be summarized on your monthly Discharge Monitoring Report Form.
- Signed and dated originals of this report must be submitted to the State (and Federal) Agencies specified in the "Monitoring and Reporting" section of your permit.

Questions? Please contact the Lab Manager, Kim Wills, at (860) 858-3153 or kimberly.wills@gza.com.

WHOLE EFFLUENT TOXICITY TEST REPORT CERTIFICATION (Permittee)

I certify under penalty of law that this document and all ATTACHMENTS were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Executed on _____ _____
[Date] [Authorized Signature]

_____
[Print or Type Name and Title]

_____
[Print or Type the Permittee's Name]

_____
[Print or Type the NPDES Permit No.]

Since the WET test and report check is complicated, the New England Bioassay Aquatic Toxicity Laboratory has certified the validity of the WET test data in the section below. Please note that this does not relieve the permittee from its responsibility to sign and certify the report under 40 C.F.R. S 122.41(k).

WHOLE EFFLUENT TOXICITY TEST REPORT CERTIFICATION (Bioassay Laboratory)

I certify under penalty of law that this document and all ATTACHMENTS were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Executed on 8/2/17 for Kim W. Wills
[Date] [Authorized Signature]

Kim Wills, Laboratory Manager
[Print or Type Name and Title]

New England Bioassay
[Print or Type Name of Bioassay Laboratory]

24. Telephone Contacts
If you have questions, please contact Joy Hilton, Water Technical Unit, at (617) 918-1877 or David McDonald, Ecosystem Assessment Unit, at (617) 918-8609.

NEW ENGLAND BIOASSAY EPA TOXICITY TEST SUMMARY SHEET

Facility Name: Royalston WWTF Test Start Date: 7/11/17
NPDES Permit Number: MA0100161 Pipe Number: _____

Test Type	Test Species	Sample Type	Sample Method
X Acute	_ Fathead Minnow	_ Prechlorinated	_ Grab
_ Chronic	X Ceriodaphnia	X Dechlorinated	X Composite
_ Modified (chronic reporting acute values)	_ Daphnia Pulex	_ Chlorine Spiked in Lab	_ Flowthru
	_ Mysid Shrimp	_ Chlorinated on site	_ Other
_ 24hr screening	_ Sheepshead	_ Unchlorinated	
	_ Menidia		
	_ Sea Urchin		
	_ Champia		
	_ Selenastrum		

Dilution Water

X receiving water collected at a point upstream of or away from the discharge, free from toxicity or other sources of contamination; (Receiving water name: Millers River)
_ alternate surface water of known quality and a hardness, etc. to generally reflect the characteristics of the receiving water; (Surface water name: _____)
_ synthetic water prepared using either Millipore Mill-Q or equivalent deionized water and reagent grade chemicals; or deionized water combined with mineral water;
_ or artificial sea salts mixed with deionized water;
_ deionized water and hypersaline brine; or
_ other _____

Effluent sampling date (s): 7/10-11/17

Effluent concentrations tested (in%): 0 6.25 12.5 25 50 100
* Permit limit concentration: ≥ 50%

Was effluent salinity adjusted? No If yes, to what value? N/A ppt
With sea salts? N/A Hypersaline brine solution? N/A
Actual effluent concentrations tested after salinity adjustment (%): 0 6.25 12.5 25 50 100

Reference Toxicant test date: 7/5/17

Test Acceptability Criteria

Mean Control Survival:	100%	Mean Control Reproduction:	N/A
Mean Diluent Survival:	100%	Mean Diluent Reproduction:	N/A
Mean Control Weight:	N/A	Mean Control Cell Count:	N/A
Mean Diluent Weight:	N/A	Mean Diluent Cell Count:	N/A

	Limits		Results
LC50	≥ 50%	LC50	>100%
		Upper Value	± ∞
		Lower Value	100%
		Data Analysis Method Used	Graphical
A-NOEC		A-NOEC	100%
C-NOEC	N/A	C-NOEC	-------
		LOEC	-------
IC25	N/A	IC25	-------
IC50	N/A	IC50	-------

CERIODAPHNIA DUBIA AQUATIC TOXICITY TEST REPORT

Test Reference Manual:	EPA 821-R-02-012, "Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater Organisms and Marine Organisms", Fifth Edition
Test Method:	*Ceriodaphnia dubia* Acute Toxicity Test – Method 2002.0
Test Type:	Acute Static Non-Renewal Freshwater Test
Temperature :	25 ± 1°C
Light Quality:	Ambient Laboratory Illumination
Photoperiod:	16 hours light, 8 hours dark
Test Chamber Size:	30 mL
Test Solution Volume:	Minimum 25 mL
Age of Test Organisms:	1-24 hours (neonates)
Number of Daphnids Per Test Chamber:	5
Number of Replicate Test Chambers Per Treatment:	4
Total Number of Daphnids Per Test Concentration:	20
Feeding Regime: per manual.	Fed YCT and *Selanastrum* while holding prior to initiating test as
Aeration:	None
Dilution Water:	Millers River
Alternate Control Water:	NEB Lab Synthetic Soft Water (hardness 40 to 48 mg/L)
Effluent Concentrations:	0%, 6.25%, 12.5%, 25%, 50% and 100% effluent
Test Duration:	48 hours
Effect measured:	Mortality – no movement of body/appendages on gentle prodding.
Test Acceptability:	≥ 90% survival of test organisms in control solution Yes X No _
Sampling Requirements:	Samples first used within 36 hours of collection Yes X No _
Sample Volume Required:	Minimum 1 liter
Test Organism Source:	NEB
Test Acceptability Criteria:	Mean Alternate Water Control Survival = 100% Mean Dilution Water Control Survival = 100%

Test Results:	Limits		Results	Status
	48-hour LC50	≥ 50%	>100%	Pass X Fail _
	Upper Value		± ∞	
	Lower Value		100%	
	Data Analysis Method Used		Graphical	
	A-NOEC		100%	

Reference Toxicant Data:		
	Date:	7/5/17
	Toxicant:	Sodium Chloride
	Dilution Water:	NEB Lab Synthetic Soft Water
	Source:	New England Bioassay
	48-hour LC50:	1.55 g/L
	In Acceptable Range:	Yes X No _____

Dechlorination Procedures: Chlorine is measured using 4500 CL-G DPD Colorimetric Method.

X Dechlorination was not required

_ Sample was dechlorinated by adding sodium thiosulfate to the sample prior to test initiation. Since dechlorination of the effluent was necessary, a thiosulfate control of diluent water spiked with sodium thiosulfate was also included in the test series. Chlorine was _____ mg/L in a dechlorinated sample.

_ Chlorine Measurement was elevated due to interference. Chlorine was _____ mg/L in a filtered sample.

_ Total Residual Chlorine was re-measured following aeration, and was found to be _____ mg/L.

Additional Notes or Other Conditions Affecting the Test:

NEW ENGLAND BIOASSAY ACUTE TOXICITY DATA FORM
COVER SHEET FOR LC50 TESTS

CLIENT:	New England Testing Lab	*C.dubia* TEST ID #	17-1038
ADDRESS:	59 Greenhill Street	COC #	c37-2687/88
	West Warwick, RI 02893	PROJECT #	05.0045052.00
SAMPLE TYPE:	Town of Royalston WWTF		
DILUTION WATER:	Millers River		

Sample Date(s): 7/10-11/17 Date Received: 7/11/17

INVERTEBRATES

TEST SET UP (TECH INIT)	KW
TEST SPECIES	*Ceriodaphnia dubia*
NEB LOT#	Cd17 (7-11)
AGE	< 24 hours
TEST SOLUTION VOLUME (mls)	30
NO. ORGANISMS PER TEST CHAMBER	5
NO. ORGANISMS PER CONCENTRATION	20
NO. ORGANISMS PER CONTROL	20

LABORATORY CONTROL WATER:

		Hardness mg/L $CaCO_3$	Alkalinity mg/L $CaCO_3$
ARTIFICIAL FW: NEB BATCH #	C37-S013	46	30

	DATE	TIME
TEST START:	7/11/17	1625
TEST END:	7/13/17	1615

RESULTS OF *Ceriodaphnia dubia* LC50 TEST

METHOD	LC50 (%)	95% Confidence Limits
BINOMIAL/GRAPHICAL	>100%	100%±∞
PROBIT		
SPEARMAN KARBER		
NOAEL	100%	

NOEC: NO OBSERVABLE EFFECT CONCENTRATION

Comments: _____

REVIEWD BY: _____ DATE: 8/2/17

NEW ENGLAND BIOASSAY
Toxicity Test Data Sheet

NEB Test #: 17-1038
Project #: 05.0045052.00
Facility Name: Town of Royalston WWTF
Date Sampled: 7/10-11/17
Date Received: 7/11/17
Sample ID: Effluent

Test Organism: *Ceriodaphnia dubia*
Organism Age: < 24 hours
Test Duration: 48 (hours)
Beginning Date: 7/11/17 Time: 1625
Dilution Water Source: Millers River
Dilution Hardness: 22 ppm as $CaCO_3$

Effluent Conc. %	Number of Surviving Organisms			Dissolved Oxygen (mg/L)			Temperature (°C)			pH		
Initials	KW	KO	PD	KW	KO	PD	KW	KO	PD	KW	KO	PD
	0	24	48	0	24	48	0	24	48	0	24	48
Control A	5	5	5	8.1	8.2	8.1	25.2	25.4	25.6	7.3	7.3	7.5
Control B	5	5	5			8.0			25.7			7.5
Control C	5	5	5			8.0			25.7			7.4
Control D	5	5	5			8.0			25.7			7.4
Diluent A	5	5	5	8.2	8.1	7.8	25.5	25.6	25.6	7.3	7.4	7.3
Diluent B	5	5	5			7.8			25.6			7.2
Diluent C	5	5	5			7.8			25.6			7.2
Diluent D	5	5	5			7.7			25.6			7.1
6.25 A	5	5	5	8.2	8.1	7.8	25.7	25.6	25.5	7.1	7.4	7.0
6.25 B	5	5	5			7.9			25.5			7.0
6.25 C	5	5	5			7.8			25.5			6.9
6.25 D	5	5	5			7.8			25.6			6.9
12.5 A	5	5	5	8.2	8.1	7.9	25.8	25.7	25.5	7.0	7.3	6.9
12.5 B	5	5	5			7.9			25.5			6.9
12.5 C	5	5	5			7.8			25.5			6.9
12.5 D	5	5	5			7.8			25.5			6.8
25 A	5	5	5	8.1	8.1	7.8	26.0	25.8	25.5	6.8	7.2	6.8
25 B	5	5	5			7.8			25.5			6.9
25 C	5	5	5			7.8			25.5			6.9
25 D	5	5	5			7.9			25.6			6.9

LC50	Confidence Interval	A-NOEC	Computational Method
>100%	100%±∞	100%	Graphical

NEW ENGLAND BIOASSAY
Toxicity Test Data Sheet

NEB Test #: 17-1038
Test Organism: *Ceriodaphnia dubia*
Project #: 05.0045052.00
Organism Age: < 24 hours
Facility Name: Town of Royalston WWTF
Test Duration: 48 (hours)
Date Sampled: 7/10-11/17
Beginning Date: 7/11/17 Time: 1625
Date Received: 7/11/17
Dilution Water Source: Millers River
Sample ID: Effluent
Dilution Hardness: 22 ppm as $CaCO_3$

Effluent Conc. %	Number of Surviving Organisms			Dissolved Oxygen (mg/L)			Temperature (°C)			pH		
Initials	KW	KO	PD	KW	KO	PD	KW	KO	PD	KW	KO	PD
	0	24	48	0	24	48	0	24	48	0	24	48
50 A	5	5	5	7.1	8.0	7.8	26.0	25.8	25.5	6.8	7.2	6.9
50 B	5	5	5			7.8			25.5			7.0
50 C	5	5	5			7.8			25.5			7.0
50 D	5	5	5			7.8			25.5			7.0
100 A	5	5	5	6.9	8.0	7.8	26.0	25.8	25.5	6.3	7.1	7.1
100 B	5	5	5			7.8			25.5			7.1
100 C	5	5	5			7.7			25.6			7.0
100 D	5	5	5			7.7			25.6			7.1

LC50	Confidence Interval	A-NOEC	Computational Method
>100%	100%±∞	100%	Graphical

Ceriodaphnia 48-h Acute Survival Test — **New England Bioassay**

Analysis ID:	04-8845-8094	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.9.2
Analyzed:	01 Aug-17 11:40	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes
Batch ID:	09-7809-1168	**Test Type:**	Survival (48h)	**Analyst:**	
Start Date:	11 Jul-17 16:25	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Receiving Water
Ending Date:	13 Jul-17 16:15	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Duration:	48h	**Source:**	In-House Culture	**Age:**	<24h
Sample ID:	04-4629-2024	**Code:**	1A99E038	**Client:**	New England Testing Labs
Sample Date:	11 Jul-17 08:00	**Material:**	WWTF Effluent	**Project:**	
Receipt Date:	11 Jul-17 15:47	**Source:**	Royalston WWTF (MA0100161)		
Sample Age:	8h	**Station:**			

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Log(X)	Linear	158714	200	Yes	Two-Point Interpolation

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	1	0.9	>>	Yes	Passes Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
LC50	>100	n/a	n/a	<1	n/a	n/a

48h Survival Rate Summary — Calculated Variate(A/B)

Conc-%	Code	Count	Mean	Min	Max	Std Err	Std Dev	CV%	%Effect	A	B
0	D	4	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.0%	20	20
6.25		4	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.0%	20	20
12.5		4	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.0%	20	20
25		4	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.0%	20	20
50		4	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.0%	20	20
100		4	1.0000	1.0000	1.0000	0.0000	0.0000	0.00%	0.0%	20	20

48h Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	1.0000	1.0000	1.0000	1.0000
6.25		1.0000	1.0000	1.0000	1.0000
12.5		1.0000	1.0000	1.0000	1.0000
25		1.0000	1.0000	1.0000	1.0000
50		1.0000	1.0000	1.0000	1.0000
100		1.0000	1.0000	1.0000	1.0000

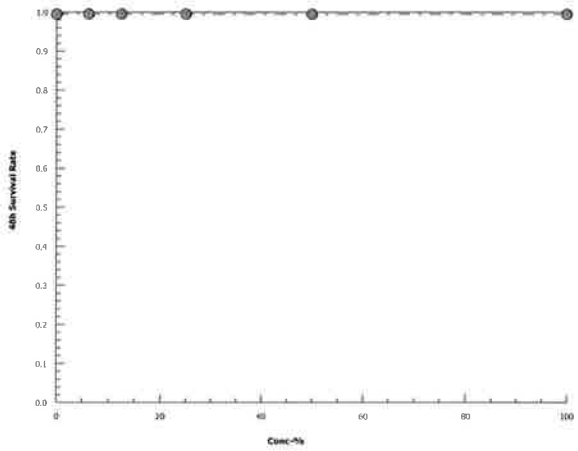
48h Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	5/5	5/5	5/5	5/5
6.25		5/5	5/5	5/5	5/5
12.5		5/5	5/5	5/5	5/5
25		5/5	5/5	5/5	5/5
50		5/5	5/5	5/5	5/5
100		5/5	5/5	5/5	5/5

Ceriodaphnia 48-h Acute Survival Test | **New England Bioassay**

Analysis ID:	04-8845-8094	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.9.2
Analyzed:	01 Aug-17 11:40	**Analysis:**	Linear Interpolation (ICPIN)	**Official Results:**	Yes

Graphics



Ceriodaphnia 48-h Acute Survival Test — **New England Bioassay**

Analysis ID:	02-5811-6395	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.9.2
Analyzed:	01 Aug-17 11:40	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes
Batch ID:	09-7809-1168	**Test Type:**	Survival (48h)	**Analyst:**	
Start Date:	11 Jul-17 16:25	**Protocol:**	EPA/821/R-02-012 (2002)	**Diluent:**	Receiving Water
Ending Date:	13 Jul-17 16:15	**Species:**	Ceriodaphnia dubia	**Brine:**	Not Applicable
Duration:	48h	**Source:**	In-House Culture	**Age:**	<24h
Sample ID:	04-4629-2024	**Code:**	1A99E038	**Client:**	New England Testing Labs
Sample Date:	11 Jul-17 08:00	**Material:**	WWTF Effluent	**Project:**	
Receipt Date:	11 Jul-17 15:47	**Source:**	Royalston WWTF (MA0100161)		
Sample Age:	8h	**Station:**			

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU
Angular (Corrected)	C > T	100	> 100	n/a	1

Steel Many-One Rank Sum Test

Control	vs	Conc-%	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Dilution Water		6.25	18	10	1	6	Asymp	0.8333	Non-Significant Effect
		12.5	18	10	1	6	Asymp	0.8333	Non-Significant Effect
		25	18	10	1	6	Asymp	0.8333	Non-Significant Effect
		50	18	10	1	6	Asymp	0.8333	Non-Significant Effect
		100	18	10	1	6	Asymp	0.8333	Non-Significant Effect

Test Acceptability Criteria

		TAC Limits			
Attribute	**Test Stat**	**Lower**	**Upper**	**Overlap**	**Decision**
Control Resp	1	0.9	>>	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0	0	5	65540	<1.0E-37	Significant Effect
Error	0	0	18			
Total	0		23			

48h Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
6.25		4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
12.5		4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
25		4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
50		4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
100		4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.00%	0.00%
6.25		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.00%	0.00%
12.5		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.00%	0.00%
25		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.00%	0.00%
50		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.00%	0.00%
100		4	1.345	1.345	1.346	1.345	1.345	1.345	0	0.00%	0.00%

Ceriodaphnia 48-h Acute Survival Test — **New England Bioassay**

Analysis ID:	02-5811-6395	**Endpoint:**	48h Survival Rate	**CETIS Version:**	CETISv1.9.2
Analyzed:	01 Aug-17 11:40	**Analysis:**	Nonparametric-Control vs Treatments	**Official Results:**	Yes

48h Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	1.0000	1.0000	1.0000	1.0000
6.25		1.0000	1.0000	1.0000	1.0000
12.5		1.0000	1.0000	1.0000	1.0000
25		1.0000	1.0000	1.0000	1.0000
50		1.0000	1.0000	1.0000	1.0000
100		1.0000	1.0000	1.0000	1.0000

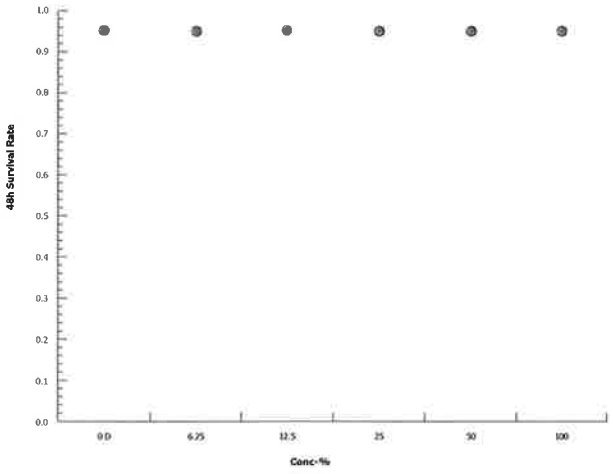
Angular (Corrected) Transformed Detail

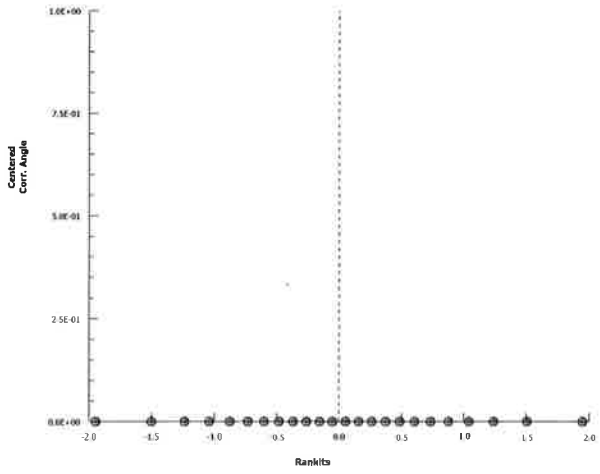
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	1.345	1.345	1.345	1.345
6.25		1.345	1.345	1.345	1.345
12.5		1.345	1.345	1.345	1.345
25		1.345	1.345	1.345	1.345
50		1.345	1.345	1.345	1.345
100		1.345	1.345	1.345	1.345

48h Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4
0	D	5/5	5/5	5/5	5/5
6.25		5/5	5/5	5/5	5/5
12.5		5/5	5/5	5/5	5/5
25		5/5	5/5	5/5	5/5
50		5/5	5/5	5/5	5/5
100		5/5	5/5	5/5	5/5

Graphics





INITIAL CHEMISTRY INFORMATION

CLIENT: Town of Royalston WWTF

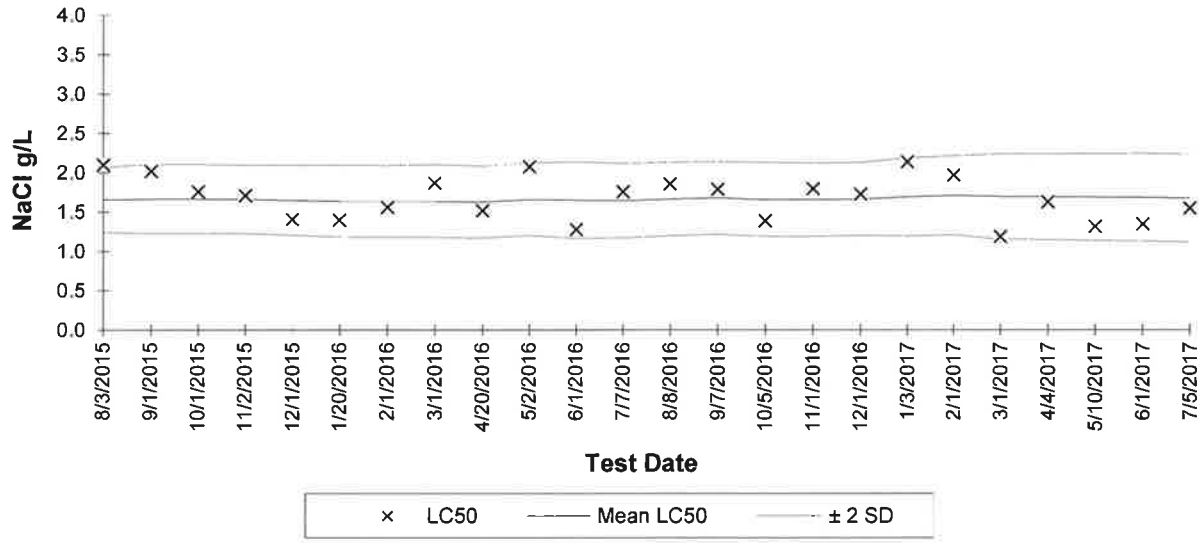
PROJECT # 05.0045052.00

RECIEPT DATE	7/11/17	
SAMPLE	Effluent	Receiving Water
COC #	C37-2687	C37-2688
Temperature (°C)	4.2	5.2
Dissolved Oxygen (mg/L)	5.8	9.1
pH (standard units)	6.0	7.2
Conductivity (µmhos/cm)	472	234
Salinity (ppt)	<1	<1
Hardness (as mg/L CaCO3)	74	22
Alkalinity (as mg/L CaCO3)	20	10
TRC - DPD (mg/L)	0.017	0.011
INITIALS	PD	PD

Additional notes:

New England Bioassay
Reference Toxicant Data: *Ceriodaphnia dubia* 48-hour LC50

Reference Toxicant: Sodium chloride
Testing Dates: Aug 2015 - July 2017



Test ID	Date	LC_{50}	Mean LC_{50}	STD	-2 STD	+2 STD	CV	CV National 75th %	CV National 90th %
15-1078	8/3/2015	2.1	1.7	0.2	1.2	2.1	0.13	0.29	0.34
15-1293	9/1/2015	2.0	1.7	0.2	1.2	2.1	0.13	0.29	0.34
15-1453	10/1/2015	1.8	1.7	0.2	1.2	2.1	0.13	0.29	0.34
15-1684	11/2/2015	1.7	1.7	0.2	1.2	2.1	0.13	0.29	0.34
15-1772	12/1/2015	1.4	1.6	0.2	1.2	2.1	0.13	0.29	0.34
16-107	1/20/2016	1.4	1.6	0.2	1.2	2.1	0.14	0.29	0.34
16-134	2/1/2016	1.6	1.6	0.2	1.2	2.1	0.14	0.29	0.34
16-298	3/1/2016	1.9	1.6	0.2	1.2	2.1	0.14	0.29	0.34
16-563	4/20/2016	1.5	1.6	0.2	1.2	2.1	0.14	0.29	0.34
16-592	5/2/2016	2.1	1.7	0.2	1.2	2.1	0.14	0.29	0.34
16-703	6/1/2016	1.3	1.7	0.2	1.2	2.1	0.15	0.29	0.34
16-885	7/7/2016	1.8	1.6	0.2	1.2	2.1	0.14	0.29	0.34
16-1156	8/8/2016	1.9	1.7	0.2	1.2	2.1	0.14	0.29	0.34
16-1252	9/7/2016	1.8	1.7	0.2	1.2	2.1	0.14	0.29	0.34
16-1466	10/5/2016	1.4	1.7	0.2	1.2	2.1	0.14	0.29	0.34
16-1586	11/1/2016	1.8	1.7	0.2	1.2	2.1	0.14	0.29	0.34
16-1730	12/1/2016	1.7	1.7	0.2	1.2	2.1	0.14	0.29	0.34
17-5	1/3/2017	2.1	1.7	0.2	1.2	2.2	0.15	0.29	0.34
17-147	2/1/2017	2.0	1.7	0.3	1.2	2.2	0.15	0.29	0.34
17-274	3/1/2017	1.2	1.7	0.3	1.2	2.2	0.16	0.29	0.34
17-475	4/4/2017	1.6	1.7	0.3	1.1	2.2	0.16	0.29	0.34
17-695	5/10/2017	1.3	1.7	0.3	1.1	2.2	0.16	0.29	0.34
17-772	6/1/2017	1.4	1.7	0.3	1.1	2.2	0.17	0.29	0.34
17-968	7/5/2017	1.6	1.7	0.3	1.1	2.2	0.17	0.29	0.34

Results:

Sample: Royalston Effluent
7G11085-01 (Water)

General Chemistry

	Result	Reporting Limit	Units	Date Analyzed
Ammonia	**2.3**	0.1	mg/L	07/17/17
Total Organic Carbon	**5.7**	1.0	mg/L	07/17/17
Total solids (TS)	**328**	10	mg/L	07/12/17
Total Suspended Solids	**8**	2	mg/L	07/12/17

Total Metals

	Result	Reporting Limit	Units	Date Analyzed
Calcium	**26.0**	0.01	mg/L	07/19/17
Magnesium	**3.05**	0.01	mg/L	07/19/17
Cadmium	**0.0003**	0.0001	mg/L	07/19/17
Lead	**0.003**	0.0002	mg/L	07/14/17
Aluminum	**0.350**	0.012	mg/L	07/19/17
Copper	**0.036**	0.005	mg/L	07/19/17
Nickel	**0.003**	0.001	mg/L	07/19/17
Zinc	**5.57**	0.005	mg/L	07/19/17
Total Hardness	**77.4**	0.0312	mg/L	07/19/17

Sample: Royalston Millers River
7G11085-02 (Water)

General Chemistry

	Result	Reporting Limit	Units	Date Analyzed
Ammonia	ND	0.1	mg/L	07/17/17
Total Organic Carbon	**7.0**	1.0	mg/L	07/17/17
Total solids (TS)	**156**	10	mg/L	07/12/17
Total Suspended Solids	ND	2	mg/L	07/12/17

Total Metals

	Result	Reporting Limit	Units	Date Analyzed
Calcium	**7.27**	0.01	mg/L	07/19/17
Magnesium	**1.03**	0.01	mg/L	07/19/17
Cadmium	ND	0.0001	mg/L	07/19/17
Lead	**0.002**	0.0002	mg/L	07/14/17
Aluminum	**0.178**	0.012	mg/L	07/19/17

Sample: Royalston Millers River (Continued)
7G11085-02 (Water)

Total Metals (Continued)

	Result	Reporting Limit	Units	Date Analyzed
Copper	ND	0.005	mg/L	07/19/17
Nickel	**0.002**	0.001	mg/L	07/19/17
Zinc	**0.010**	0.005	mg/L	07/19/17
Total Hardness	**22.4**	0.0312	mg/L	07/19/17

MICROBAC®

Microbac Laboratories, Inc. - Dayville

CERTIFICATE OF ANALYSIS

D7G1519

New England Testing Laboratory

Karen Staple
59 Greenhill Street
West Warwick, RI 02893

Project Name: 7G11085

Project / PO Number: 7G11085
Received: 07/18/2017
Reported: 07/24/2017

Analytical Testing Parameters

Client Sample ID: Effluent
Sample Matrix: Aqueous
Lab Sample ID: D7G1519-01
Collected By: Customer
Collection Date: 07/11/2017

Inorganics	Result	RL	Units	Note	Prepared	Analyzed	Lab
Method: SM2540 C-1997							
Total Dissolved Solids (TDS)	**333**	25.0	mg/L		07/18/17 2207	07/20/17 1521	DAY

Client Sample ID: Millers River
Sample Matrix: Aqueous
Lab Sample ID: D7G1519-02
Collected By: Customer
Collection Date: 07/11/2017

Inorganics	Result	RL	Units	Note	Prepared	Analyzed	Lab
Method: SM2540 C-1997							
Total Dissolved Solids (TDS)	**151**	25.0	mg/L		07/18/17 2207	07/20/17 1521	DAY

Laboratory

DAY: Microbac Laboratories, Inc. - Dayville

Definitions

RL: Reporting Limit

Project Requested Certification(s)

Microbac Laboratories, Inc. - Dayville
M-CT008 — Massachusetts Department of Environmental Protection

Report Comments

Samples were received in proper condition and the reported results conform to applicable accreditation standard unless otherwise noted.

The data and information on this, and other accompanying documents, represents only the sample(s) analyzed. This report is incomplete unless all pages indicated in the footnote are present and an authorized signature is included.

Reviewed and Approved By:

David P. Dickinson For Samantha L. Boyle
Project Manager
Samantha.Boyle@microbac.com
07/24/2017 12:21

NEW ENGLAND BIOASSAY
CHAIN-OF-CUSTODY

EFFLUENT

Sampler: Denis Meunier
Title: Operator
Facility: Royalston WWTP
Address: 15 Blossom Street
South Royalston, MA 01368

RECEIVING WATER

Sampler:
Title:
Facility: Royalston WWTP
Address: 15 Blossom Street
South Royalston, MA 01368

Sample Information

Collection Method: ___ Grab / X Composite
Sample ID: Effluent
Start & End Dates: 7/10 - 7/11/17
Start & End Times: 8 AM - 8 AM
Type of Sample: X WWTF Effluent / ___ Industrial Effluent / ___ Other
Is the sample: ___ Prechlorinated / X Dechlorinated / ___ Chlorine spiked in lab / ___ Unchlorinated

Collection Method: X Grab / ___ Composite
Sample ID: Millers River
Date Collected: 7/11/17
Time Collected: 9:00 AM
Type of Sample: X Receiving Water / ___ Other
Is the sample: X Unchlorinated

Received ON ICE

Site Description: Wastewater Treatment Facility
Sample Collection Procedures: Composite Sampler

Sample Shipment

Method of Shipment: NET/NEB COURIER

Relinquished By:	Denis Meunier	Date: 7/11/17	Time: 10 AM
Received By:	[illegible]	Date: 7/11/17	Time: 12:50 pm
Relinquished By:	[illegible]	Date: 7/11/17	Time: 3:00 pm
Received By:	Chris Rau	Date: 7/11/17	Time: 3:00 pm

Optional Information

Relinquish Chris Rau 7/11/17 3:47 PM
Purchase Order # to reference on invoice: [illegible] 7/11/17 1547

E-mail address: dencat1@hotmail.com Would you like a PDF report copy E-mailed to this address? Yes ☐ No ☐

FOR NEB USE ONLY

Temperature of Effluent Upon Receipt at Lab: 4.2 °C
Temperature of Receiving Water Upon Receipt at Lab: 5.2 °C
Effluent COC# C37-2687
Receiving Water COC# C37-2688

IF THIS COOLER IS MISPLACED OR THE LABEL IS LOST, PLEASE SHIP TO:
KIM WILLS, NEW ENGLAND BIOASSAY, 77 BATSON DRIVE, MANCHESTER CT 06042